



Tentative



March 11 2011 Earthquake and Tsunami in Japan's Tohoku Region

Rapid Damage Assessment and Need Survey
March 21-24

Asian Disaster Reduction Center (ADRC)
International Recovery Platform (IRP)

Field Visit

Mon., March 21 Flew from Osaka to Yamagata

Tue., March 22 Visited tsunami-hit areas in Miyagi Prefecture: Wakabayashi ward (eastern part of Sendai city) and Matsushima town, Higashi-Matsushima city, Ishinomaki city, and Onagawa town along the Pacific coast

Wed., March 23 Visited (a) Government's Field Disaster Response Headquarters set up in Miyagi Prefecture, (b) Miyagi Prefecture's Disaster Response Headquarters, (c) Sendai City's Disaster Response Headquarters, (d) Minami-Sanriku town

Thur., March 24 Returned from Yamagata

Summary of the March 11 earthquake

Date and Time:

11 March 2011 at 14:46 JST (5:46 GMT)

Type of earthquake:

Plate-boundary thrust-faulting earthquake on or near the Japan Trench subduction zone

Hypocenter:

130km off the Pacific coast of Tohoku region (38° N, 142° E), 24km depth

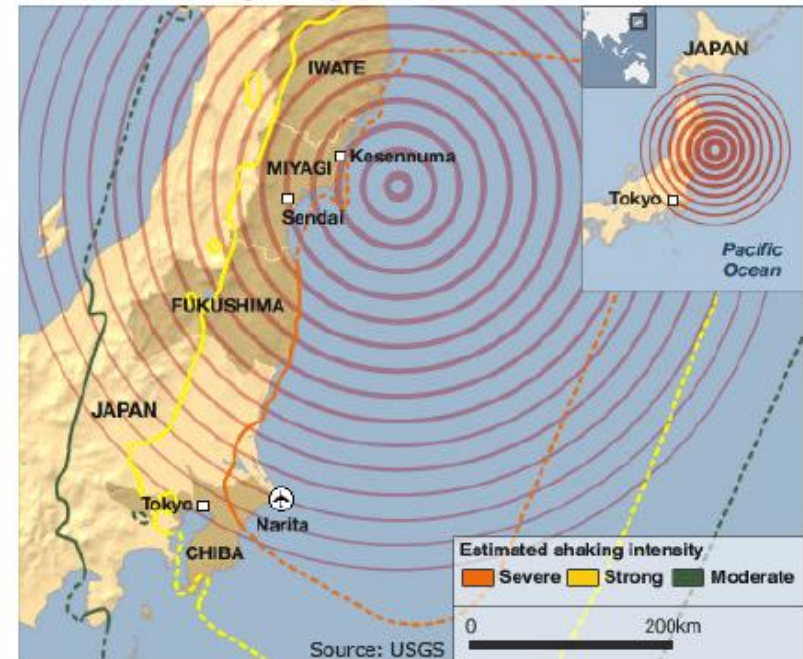
Magnitude:

9.0 (interim value, the largest in Japan and the 4th largest in the world)
c.f. 2004 Sumatra Earthquake M9.1

Damage:

The destruction of social infrastructure, housing and corporate facilities would cost between 16 and 25 trillion yen (Cabinet Office's estimate)

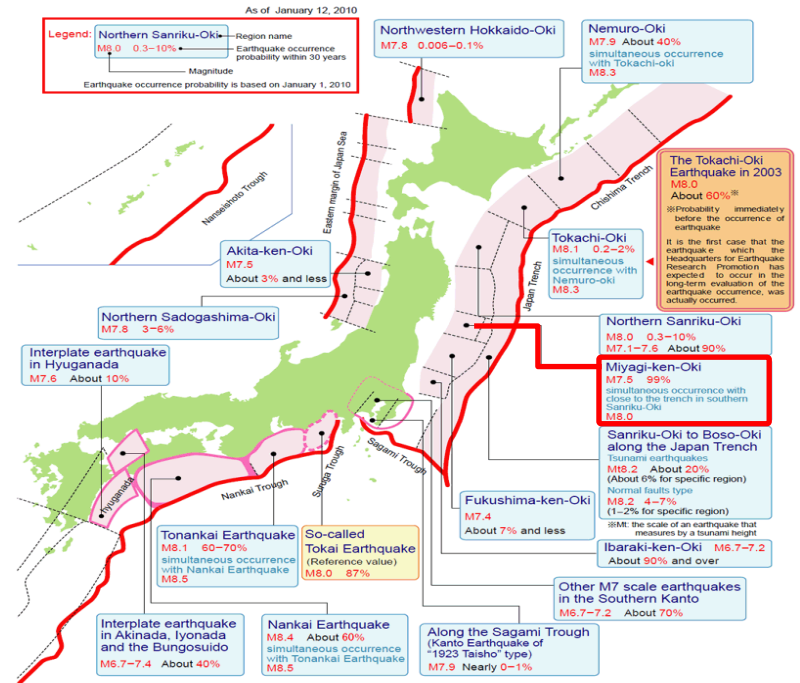
Areas affected by the quake



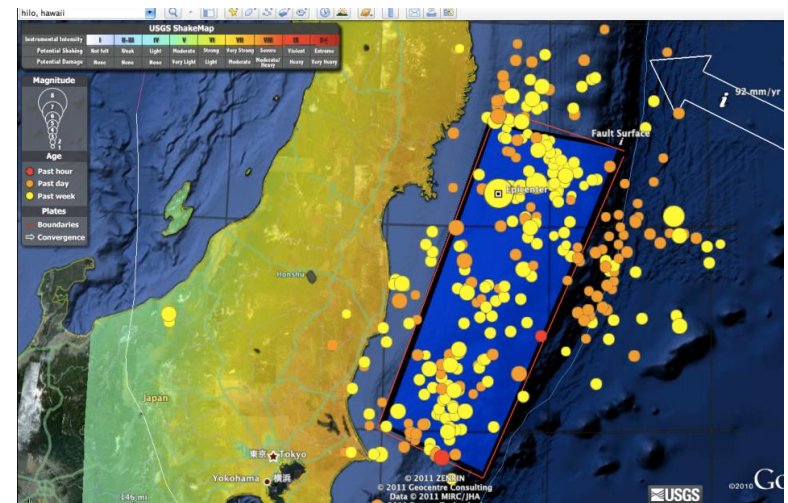
Source: OCHA Situation Report No.1

Main characteristics of the March 11 earthquake

- The areas hit by the earthquake and tsunami along Pacific Sea coast were known to be vulnerable to tsunami as they were recurrently hit by tsunami. Large offshore earthquakes occurred in the same subduction zone in 1611, 1896 and 1933 and each of them caused devastating tsunami on the coast.
- Large inter-plate earthquakes had been predicted to occur in this region with 99% probability within thirty years and the magnitudes ranging from M7.5 to M8.0.
- The March 11 earthquake was much bigger than the prediction, recoding M9.0 and the rupture zone stretched 500 km length and 200 km width. Some experts say that the earthquake was the one by a thousand year return period.



Source: The Headquarters of Earthquake Research Promotion



Source: USGS

Casualties

The number of casualties continues to rise. The Government has confirmed 10,102 people have died. It has already exceeded that the 1995 Great Hanshin Awaji (Kobe) Earthquake. The number of people who are missing covers only those who have been reported to the police by their families or acquaintances. It is likely that there are still thousands of people missing that are uncounted. The number of refugees once topped 30 thousand, but it has been decreasing as the situation stabilized and services and utilities and services gradually restored.

As of 8:00 am March 26 2011

Prefecture	Killed	Missing	Refugees
Iwate	3,092	4,878	43,728
Miyagi	6,097	6,237	86,927
Fukushima	855	5,934	86,308
Others	58	4	29,146
Total	10,102	17,053	246,109

Source: The Emergency Disaster Response Headquarters

Okada, Wakabayashi-ward of Sendai City



Okada elementary school
Evacuation center



Still inundated



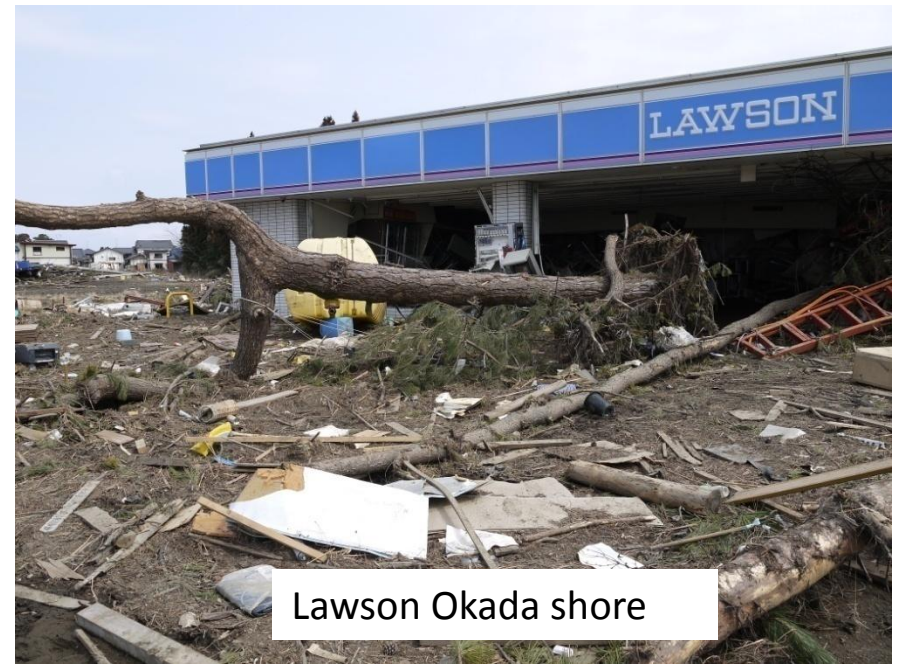
Search Activities



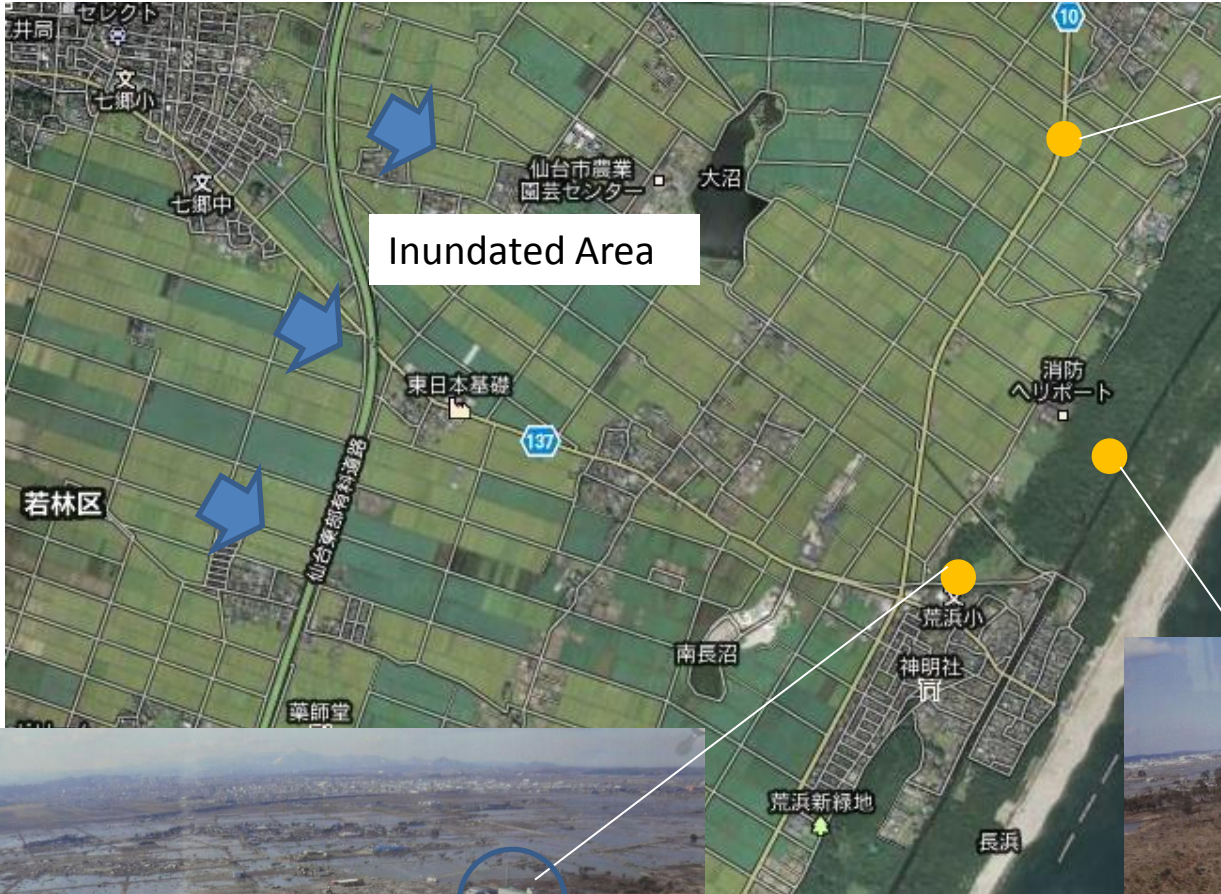
Water level could be 1.5m high

Okada, Wakabayashi-ward Sendai City

Along the road (Rout Shiogama-Watari)
near the seashore



Arahama, Wakabayashi-ward of Sendai City



Search Activities



Houses disappeared

Arahama elementary school (4 story building)

(Source : Sendai city government)



Windbreak forest swept away

(Source : Sendai city government)

Area along Route 45 Tagajo City ~ Naruse River



Matsushima town



Naruse river



Shiogama port



Tagajo city



Tagajo city



Shiogama port

Higashi-Matsushima City



Downtown of Ishinomaki city

Yamoto station
(Senseki line)

Farm land

Residential area

Ishinomaki port



Inundated farm land



Completely destroyed residential area



Waterway

Ishinomaki City

(Most of urban area
was inundated
except for hilly area)

Hilly Area

Hilly Area

Urban area is facing the sea



Factories destroyed by fire



Ishinomaki municipal hospital



Houses on a hill

Houses destroyed by fire



Houses destroyed by tsunami

Ishinomaki City (22 March 2011)

Ishinomaki city is the second largest city in Miyagi Prefecture with population of around 160 thousand. Economically, it depends on fishing and marine product processing, shipbuilding and paper and pulp industries. 2,127 people have been confirmed died and 2,720 people missing (Miyagi Prefecture).

Kadowaki district (below), which was industrial areas close to the port with a river running just right beside, was washed away by tsunami and burnt down by subsequent spread fires. In clear contrast, houses standing on a hill looked undamaged from a distance.

Self Defense Forces searching missing people and helping remove the debris



houses on a hill look undamaged



Ishinomaki city (22 March 2011)

Most of buildings in Kadowaki district collapsed. A close look at it reveals that they were not only collapsed by tsunami but also burned down by spread fires.

Inside warehouses and factories
near the port



Ishinomaki city (22 March 2011)

The downtown areas of Ishinomaki city were inundated (1 to 3 meters) and many buildings (shops, restaurants, apartments) were heavily damaged. Ships, cars and debris were still scattered everywhere in downtown areas.



Onagawa town



Municipal Hospital (Evacuation Center)



Toward town office



Residential Area



Downtown

Onagawa town (22 March 2011)

Onagawa town, a small fishing town with population of 10 thousand, showed different landscape from Ishinomaki city as debris were piled up at both sides of the streets and many of the buildings were collapsed or heavily damaged.



Onagawa town (22 March 2011)

A car was carried to the rooftop of a three-story building. Many reinforced concrete buildings were also collapsed or heavily damaged everywhere in the town, indicating extremely strong impact of tsunami.

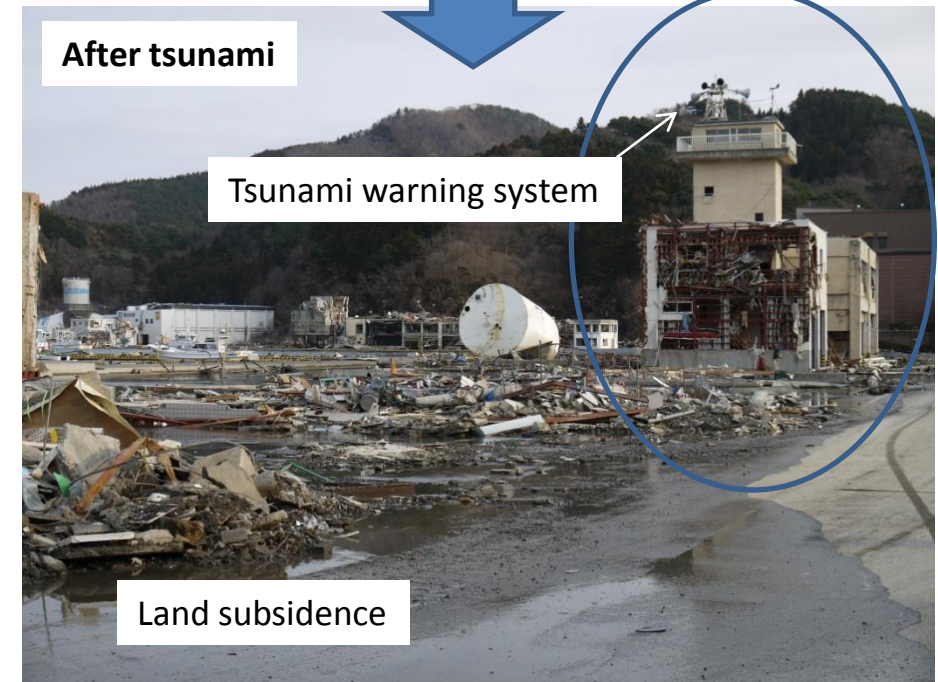
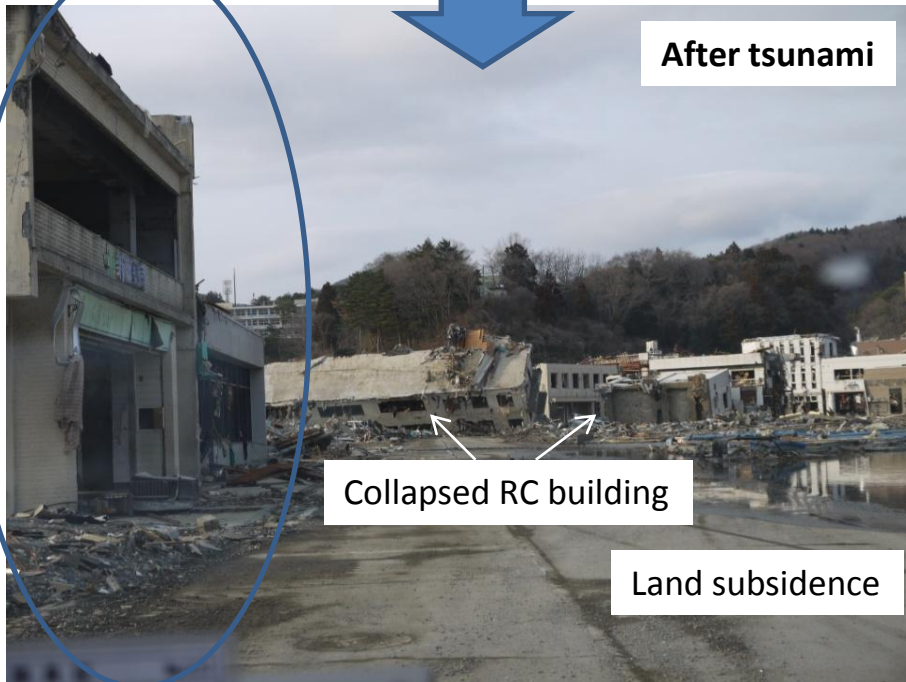
A car on the rooftop of a building



Collapsed RC buildings

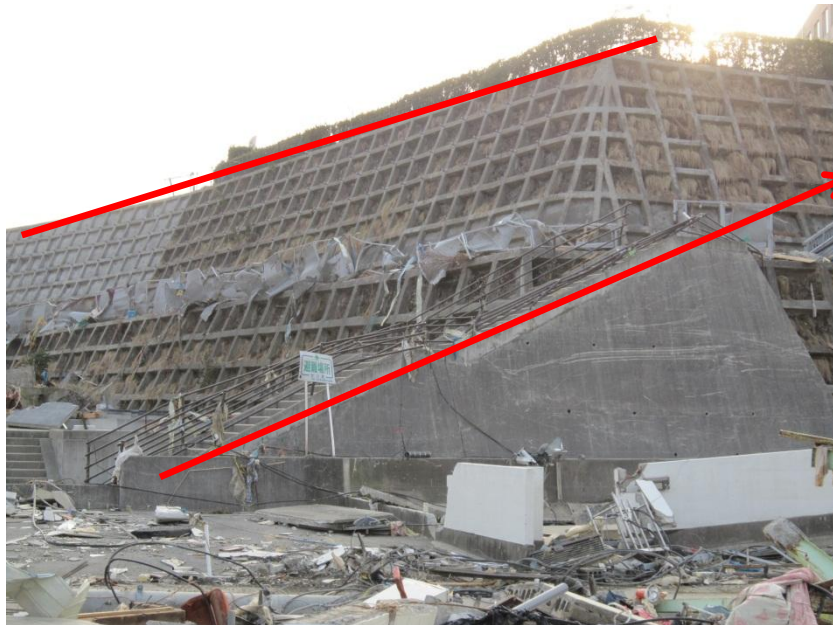


Downtown Onagawa town before and after tsunami



Onagawa town (22 March 2011)

A hill just behind the port was designated as an evacuation area where a public hospital is situated. There are traces of water even inside the hospital building. Debris and garbage were scattered on the ground, indicating that the tsunami had reached the top of the hill which is nearly 16 meters high.



Designated evacuation route



Evacuation center of Onagawa town



Onagawa municipal hospital on a hill



Destroyed fence of the hospital



Destroyed roof of the 4 stories building



Cars carried on the hill by tsunami

Minami-Sanriku town



Inundated area (2km from the sea)



Shizugawa elementary school on a hill



Disaster management center



The town has disappeared



Evacuation building (4 stories high)



Floodgate was closed



Destroyed Seawalls

Minami-Sanriku town (23 March 2011)

Minami-Sanriku town, where almost entire village, except for some communities situated on higher ground, was one of the town completely washed away and flattened. Debris have reached as far as more than 2.0 km from the coastal line.



Minami-Sanriku town (23 March 2011)

At Shizugawa hospital (left below) located near the coast (some 200 meters), there were traces that tsunami had reached the 4th floor (about 16 meters high) and people escaped to the rooftop deck. An apartment building (right below) was situated right next to the coast and designated as an evacuation building as shown by evacuation signs, but there were traces that tsunami also had reached the 4th floor.



Minami-Sanriku town (23 March 2011)

This three-story building (below) was the disaster management center of the town which was also designed to function as a tsunami evacuation building. At the time of tsunami, about thirty municipal officials evacuated to the rooftop but only ten of them survived. A young female official who kept delivering evacuation message to the villagers until the last moment has not been found yet.



Government's first response (day one)

The Government's first response was very quick as the earthquake and tsunami occurred during working hours and information about the earthquake and resultant tsunami were transmitted rapidly. Live images of the horrifying tsunami approaching and striking coastal towns and villages were shown on TVs.

- 3.11 14:46 Earthquake occurred
- 14:49 J-ALERT transmitted tsunami warning to municipalities
- 14:50 1st emergency response team meeting
- Prime Minister gave directions
- 15:14 "Emergency Disaster Response Headquarters" established
- 16:54 Press briefing by Prime Minister
- 18:42 Government's rapid survey team dispatched from Tokyo by helicopter
- 21:05 The team arrived at Miyagi Prefecture Government

Source: The Emergency Disaster Response Headquarters

The number of people rescued

The Government's search and rescue teams, composed of police, fire service, coast guard and Self Defense Forces, have rescued and saved approximately 26,646 people as of March 26. Operations are still ongoing.

Date	Police	Fire Service	Coast Guard	Self Defense Forces
March 11	32	3	4	About 19,300
March 12	397	610	207	
March 13	1,631	3,725	22	
March 14	448	238	16	
March 15	1,183	2	24	
March 16	27	-	24	
March 17	29	-	-	
March 18 -25	2	2	22	
Total	3,749 (a)	4,580 (a)	319	

Source: The Emergency Disaster Response Headquarters

Note: Of which, 1,302 were rescued by joint teams of police and fire service.

Summary of relief supplies

Total volume of relief supplies already delivered (as of 26 March)

1. Food and water

- Bread: 3,298,705 pieces
- Instant noodle: 1,185,146 pieces
- Rice ball, etc. 1,642,897 pieces
- Rice 2,322,731 packages
- Canned food, etc. 1,377,510 pieces
- Water 3,986,671 bottles

2. Other commodities

- Toilet paper rolls 295,136 packages
- Diaper 258,505 packages
- Medicine 187,960 boxes
- Face mask 2,216,222 pieces

3. Fuel 9,572,000 liter

Deployment of first responders

1. National Police Agency

- Inter-prefectural Emergency Rescue Units with a total of 10,301 officers have been mobilized. As of March 26, a total of 4,585 officers are doing the operations

2. Fire and Disaster Management Agency

- About 19,300 officers in 4,700 units of Fire Rescue Task Forces or “Hyper Rescue Teams” have been mobilized. As of March 26, total of 2,629 officers in 690 units are doing the operations

3. Japan Coast Guard

- 54 patrol boats and 19 aircrafts have been deployed

4. Ministry of Defense (Self Defense Force)

- About 107 thousand officers have been deployed (Ground SDF 70,00, Maritime SDF 15,200 and Air SDF 21,300)

5. Ministry of Health, Labor and Welfare

- 109 teams of doctors and 105 teams of health nurses have been deployed

International Assistance

1. US Forces stationed in Japan

- Mobilized about 20 aircraft carriers and warships, and about 160 aircrafts
- About 20 thousand officers are deployed

2. International assistance

- The Government of Japan has received 131 offers of assistance from countries and a province (i)
- Search and Rescue teams from 21 countries and a province (i) have operated, 2 out of which are still in operations
- The Government has accepted relief items from 23 countries and a province (i)

Note: (i) Taiwan Province of China

Source: The Emergency Disaster Response Headquarters

Disaster Response Headquarters

Prefectures' Disaster Response Headquarters have been established at Miyagi, Iwate and Fukushima. The national government also established its own field headquarters. As such, coordination between national government and prefectures have been made on the spot, and if necessary, requests will be transmitted to national ministries and agencies in Tokyo. One of salient features of the response effort is the support from other prefectures in Japan that dispatched their officials to help disaster stricken prefectures. For instance, Hyogo Prefecture sent officials to Miyagi Prefecture. At city level, Kobe city sent officials to Sendai city.



Evacuation Center (March 23 2011)

The evacuation center established at a primary school gymnasium in Minami-Sanriku town (left below) was well organized. People help each other and necessary coordination was made by their own community leaders. It was reported that most of necessary basic food items were delivered. However this center was very crowded and people left cold because of insufficient heating. Self Defense Forces from Okinawa were stationed at this center to provide food and other services. Usually, evacuees are expected to stay in such an emergency center for a couple of weeks. After that, the government will provide temporary housing units or alternative means. However, in this particular case, construction of temporary housing units is likely to take more time than usual.



Initial observations (1/2)

- Pacific Sea coastal areas in Iwate Prefecture and the northern part of Miyagi Prefecture are known to be vulnerable tsunami. These areas had been recurrently devastated by large tsunami in the past. Before the march 11 tsunami, various measures such as construction of 10m high dykes, tsunami evacuation buildings and shelters, evacuation routes, evacuation drills, and so forth were taken. On the other hand, the coastal areas of Fukushima Prefecture and the southern part of Miyagi Prefecture have not been regarded as very risky from tsunami.
- Large inter-plate earthquakes were predicted to occur around that region, with 99% probability in thirty years and expected magnitudes ranging from M7.5 to M8.0, but the March 11 earthquake was much bigger than predicted. The march 11 earthquake, recording M9.0, was the 4th strongest ever recorded in history around the world. Some say that the occurrence of this kind of earthquake and tsunami is by one thousand return period.

Initial observations (2/2)

- It is reported that tsunami as high as 10 to 15 meters hit the coastal areas, with the maximum height so far measured 23 meters. The inundation area was calculated by Geospatial Information Authority of Japan as approximately 400 square kilometers.
- The Cabinet Office has estimated that the destruction of social infrastructure, housing and corporate facilities in the areas would cost between 16 trillion yen and 25 trillion yen. These estimates reflect only damages to structures, hence do not include the loss of economic activities triggered by the earthquake, tsunami, power outage and nuclear power plant accidents.

Issues and challenges (1/3)

- Full-scale recovery and rebuilding should start as soon as possible, but there are many issues to be resolved, including: (1) whether they should rebuild their towns in original places which were washed away by tsunami or relocate them to somewhere else in safer places; (2) in the former case, what kind of protection measures should be accompanied; (3) in the latter case, how to deal with privately owned land in original places; (4) who should develop such reconstruction plans and how to coordinate with local communities.
- Recovery and reconstruction will certainly take many years. It is therefore of great necessity to support victims to rebuild their own houses and restore their livelihoods by helping them maintain their incomes for coming years.

Issues and challenges (2/3)

- In usual cases, evacuees stay at evacuation centers for a couple of weeks, and then move to temporary houses to be constructed by local governments and stay there for a couple of years before they finally find permanent houses either private houses or public houses. This scheme may not work smoothly because the number of people who have lost their homes is so large that government cannot construct sufficient temporary houses in time. Ministry of Land, Infrastructure, Transport and Tourism plans to provide 8,800 units in Iwate, 10,000 units in Miyagi, 14,000 units in Fukushima (Construction is done by prefectures). Construction of 632 units in Iwate and 235 units in Fukushima already started.
- Many of tsunami-hit small towns are basically dependent on fishery, marine product processing and tourism. Their economic bases, which had not necessarily been strong before the disaster, are now badly damaged. The earthquake and tsunami therefore has had greatly negative impact on already fragile industrial bases. Thus, how to restore their industrial bases is a priority issue but a big challenge as well for many towns and communities.

Issues and challenges (3/3)

- Communities need to be maintained throughout the entire process, and, moreover, they are expected to play a central role in recovery and reconstruction phases. Hence, how to empower them is a challenging but important task.
- Likewise, NPOs both Japanese and international should also need to be mobilized to complement government's operations. The Government has stated that "Search and Rescue operation phase still continues in the affected areas at this moment and the access to those areas is limited to rescue workers. There is temporary shortage of petrol in the affected areas and thus international/foreign NGOs are recommended to wait until the situation improves so that those NGOs are able to conduct their activities in a self-sustained way". Since Japan has limited experience of working with international/foreign NGOs within Japan, coordination with them will be an issue.



ADRC and IRP will continue to work on this disaster and keep updating the information. For inquiries and comments, please contact:

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